901514

SAUGET AREA 1 SUPERFUND SITE
PROPOSED PLAN
ST CLAIR COUNTY, ILLINOIS

Community Participation

EPA and Illinois EPA provide information regarding the Sauget Area 1 Superfund Site through public meetings, the Administrative Record for the Site, and announcements published in the *Belleville News-Democrat* EPA and Illinois EPA encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site Additional information can also be found at EPA Regions V's web site located at www epa gov/region05/cleanup/saugetarea1

The Administrative Record, which contains the information used to develop the site remedy, is at the following location

Public Library
Cahokia Public Library
140 Cahokia Park Drive
Cahokia, Illinois

The public comment period will run for a total of thirty days and be from February 27, 2013 to March 28, 2013 and the EPA will be accepting written comments on the Proposed Plan during the public comment period Written comments can be sent to the following address

Patricia Krause
Community Involvement Coordinator
United States Environmental Protection Agency
Mail Code SI-7J
77 W Jackson Blvd Chicago, IL 60604

A **public meeting** will be held on March 5, 2013 to discuss all the alternatives and the preferred remedy Written and oral comments will be accepted at the meeting The meeting will be held at the following location

March 5, 2013
6 30 PM to8 00 PM
Cahokia Village Hall
103 Main Street, Cahokia, IL

This Proposed Plan provides a description of the Sauget Area 1 Site ("Site") and summarizes all clean-up activities already completed to date by the United States Environmental Protection Agency (EPA) and potentially responsible parties (PRPs) for the Site It also identifies the Preferred Remedial Alternative ("Preferred Alternative") for cleaning up the remaining soil and groundwater source contamination at the Site and provides the rationale for this preference In addition, this Proposed Plan includes summaries of other clean-up alternatives evaluated for use at this Site

As explained further in this document, this Proposed Plan, and the alternatives discussed, relate only to soil and groundwater source contamination existing on the Sauget Area 1 Site EPA will propose a separate plan to address groundwater contamination in the Sauget area after remedies are chosen for the groundwater contamination source areas discussed in this Proposed Plan, and in the forthcoming Proposed Plan for soil and groundwater source areas in the Sauget Area 2 Superfund Site

This document is issued by EPA, the lead agency for Site activities, and the Illinois Environmental Protection Agency (Illinois EPA), the support agency Following issuance of this Proposed Plan, and after considering any and all public comments received during the 30-day public comment period, EPA, in consultation with Illinois EPA, will select a final remedy for the soil and groundwater source contamination existing on the Sauget Area 1 Site This final remedy will be presented in a document called a Record of Decision (ROD) EPA, in consultation with Illinois EPA, may modify the Preferred

Alternative or select another response action presented in this Plan based on new information or public comments Therefore, the public is encouraged to review and comment on all of the alternatives presented in this Proposed Plan

EPA is issuing this Proposed Plan in accordance with Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires the issuance of decision documents for remedial actions taken pursuant to Sections 104, 106, 120, and 122 This Proposed Plan is also part of EPA's public participation responsibilities under 40 CFR § 300 430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation/ Feasibility Study (RI/FS) report and other documents contained in the Administrative Record file for this Site

EPA and the State encourage the public to review these documents to gain a more comprehensive understanding of the Site and the extensive Superfund activities that have been conducted at the Site to date

I SITE HISTORY

The Sauget Area 1 Site is located in the Villages of Sauget and Cahokia, in St Clair County, Illinois, just east of the Mississippi River, and consists of three closed waste disposal areas (Sites G, H, and I), a backfilled impoundment (Site L), an inactive borrow pit (Site M), a closed construction debris disposal area (Site N), and approximately 3 2 miles of Dead Creek Figure 1 shows the location of the Sauget Area 1 sites

Since the early 1900s, over 50 percent of the land on the east bank of the Mississippi River between Cahokia and Alton, Illinois has been used for heavy industrial purposes Local area wastes, including chemical and industrial wastes from a variety of processes and sources, have been disposed of in Sauget Area 1 starting prior to the 1920s

A variety of industrial and municipal wastes and contaminated soil are present in the above referenced closed waste disposal areas in Sauget Area 1 The disposal areas contain crushed drums, uncontained wastes, construction debris, and miscellaneous trash Contaminants include a variety of volatile and semi-volatile organic compounds such as chlorobenzene and 1,4-dichlorobenzene, herbicides such as pentachlorophenol, polychlorinated biphenyls (PCBs), 2,7,3,8-TCDD TEQS (dioxin), and metals

Site G is located in the Village of Sauget, south of Queeny Avenue, west of Dead Creek and north of the containment cell constructed for the Sauget Area 1 Removal Action Approximately five acres in size, Site G was operated and served as a disposal area from approximately 1940 to 1966, and was subject to intermittent dumping thereafter until 1982 EPA contained and consolidated the waste on site in 1995 (See below "Clean-up Activities to Date") Currently the site is covered with a soil cap, covered with vegetation, enclosed by a fence, and not used However, waste areas also extend beyond the fenced area to the west, under a parking lot and industrial storage building

Site H is located in both the Village of Sauget and the Village of Cahokia, south of Queeny Avenue, west of Falling Springs Road and east of the Metro Construction Company property It occupies approximately five acres of land and is connected to Site I under

Queeny Avenue Industrial wastes were disposed at Site H from approximately 1931 to 1957 Currently, Site H is graded and grass covered with some areas of exposed slag

Site I is located in the Village of Sauget, north of Queeny Avenue, west of Falling Springs Road and south of the Alton & Southern Railroad Site I covers approximately 19 acres, although not all of it contains waste Site I is connected to Site H and together they formerly were known as the "Sauget Monsanto Landfill" It received industrial and municipal wastes from approximately 1931 to 1957 Currently, Site I is fenced, graded, covered with crushed stone, and used for equipment and truck parking

Contamination present beneath Sites G, H, and I South contributes to a large plume of chlorinated organic-contaminated groundwater which flows toward the Mississippi River Before reaching the River, (which is approximately one mile west of Sauget Area 1), some of the mass of chlorinated organics dissolved in the groundwater is removed by processes that occur naturally in the aquifer, such as biodegradation Of the portion of the Sauget Area 1 plume that reaches the River, it is estimated that over 65%[1] of the contaminant mass is captured by a groundwater migration control system (GMCS)[2], which is part of the Sauget Area 2 Superfund Site located closer to the River The GMCS captures and pumps an estimated 210 million gallons of contaminated groundwater a year, which is subsequently treated by the American Bottoms Regional Water Treatment Facility in Sauget Sites G, H, and I South also contribute to an area of residual dense non-aqueous phase liquids (DNAPL[3]) in the aquifer matrix, which is present under and close to the disposal areas The residual DNAPL located beneath Sites G, H, and I South act as an on-going source of contaminants that can dissolve in groundwater

Site L is located in the Village of Cahokia, immediately east of Dead Creek and south of the Metro Construction Company property Site L was used for the disposal of wash water from truck cleaning operations from approximately 1971-1981 The trucks were used for bulk-chemical transport The area of the wash water impoundment was approximately 7,600 square feet Site L is now covered by cinders and used for equipment storage

Site M is located in the Village of Cahokia, along the eastern side of Dead Creek at the western end of Walnut Street Originally used as a borrow pit in the 1940s, Site M was connected to Dead Creek through an opening and contaminants were carried to the site from water from the creek An estimated 3,600 cubic yards of contaminated sediments was located in this borrow pit prior to the Site being remediated, backfilled, and fenced during the 2000 Dead Creek sediment removal (see below "Clean-up Activities to Date")

Site N, which is located on property formerly owned by the H H Hall Construction Company, was primarily used for disposal of construction debris The waste materials

---

[1] The 2012 updated regional groundwater flow and transport model (GSI 2012) was used to quantify the percent of dissolved constituent mass flux captured by the groundwater migration control system

[2] The installation of the Sauget Area 2 Groundwater Migration and Control System (GMCS) was required by EPA as an interim groundwater remedy for the Sauget Area 2 site This system is comprised of a 3 300 ft long U shaped fully penetrating barrier wall located downgradient of Sauget Area 2 Site R and Sauget Area 1 which extends from approximately 3 feet below ground surface to the top of bedrock and includes three groundwater extraction wells on the upgradient side of the barrier wall

[3] DNAPLs are dense non aqueous liquids that are denser than water Because of their physical and chemical properties they tend to sink vertically to the bottom of the groundwater aquifer and do not mix easily with water acting as a continual source of groundwater contamination until they are removed or dissipate

found in Site N included soil, brick, concrete, metal, tires, and wood, as well as some crushed drums

Dead Creek, which runs through the middle of Sauget Area 1, is an approximately 17,000 foot long, actively-managed storm water conveyance channel The creek runs through heavily-developed residential and commercial areas in its upper reaches and through agricultural and undeveloped areas in its lower reaches before it discharges to Prairie du Pont Creek at the Metro East Sanitary District lift station Prairie du Pont Creek is located at the southern end of Dead Creek and routes all of the water from Dead Creek to the Mississippi River As part of Illinois EPA's investigation of Sauget Area 1 in the 1980s, it subdivided Dead Creek into the following six segments (Creek Segments A, B, C, D, E, and F)

- Creek Segment (CS) A was the northernmost segment of the creek and was approximately 1,800 feet long and 100 feet wide running from the Alton & Southern Railroad to Queeny Avenue This segment of the creek originally consisted of two holding ponds, which were periodically dredged For several years, CS-A and available downstream creek segments (e g , ones that were not blocked off) received direct wastewater discharges from industrial sources and served as a surcharge basin for the Village of Sauget (formerly Village of Monsanto) municipal sewer collection system

- Creek Segment B extends for approximately 1,800 feet from Queeny Avenue south to Judith Lane Sites G, L, and M of the Sauget Area 1 Site border this creek segment Land use surrounding CS-B is primarily commercial with a small residential area near the southern end of this segment Agricultural land lies to the west of the creek and south of Site G

- Creek Segment C extends for approximately 1,300 feet from Judith Lane south to Cahokia Street Land use is primarily residential along both sides of CS-C

- Creek Segment D extends for approximately 1,100 feet from Cahokia Street to Jerome Lane Land use is primarily residential along both sides of CS-D

- Creek Segment E extends approximately 4,300 feet from Jerome Lane to the intersection of Illinois Route 3 and Route 157 Land use surrounding CS-E is predominantly commercial with some mixed residential use

- Creek Segment F is approximately 6,500 feet long and extends from Route 157 to the Old Prairie du Pont Creek CS-F is the widest segment of Dead Creek and a large wetland area extends several hundred feet out from both sides of the creek

II CLEAN-UP AND INVESTIGATIVE ACTIVITIES TO DATE

In the mid-1980s, Illinois EPA conducted a detailed expanded Site investigation to determine levels of contamination present in the Sauget Area Sites[4] Since this investigation, extensive clean-up activities have been implemented in Sauget Area 1

Starting in 1990, Cerro Flow Products remediated Creek Segment A under a plan approved by Illinois EPA Under this plan, Cerro excavated approximately 27,500 tons of contaminated sediments out of Dead Creek, which it disposed of in off-site disposal facilities

In 1995, in Site G, EPA excavated and consolidated approximately 15,000 cubic yards of contaminated soil, stabilized and solidified 1,200 cubic yards of oil pit material, covered the excavated area with 18 to 24 inches of clean soil, and seeded the site to restore the vegetative cover and prevent erosion

In 1999, EPA issued a Unilateral Administrative Order (UAO) to a Potentially Responsible Party (PRP), Monsanto Company and Solutia Inc , to replace culverts on Dead Creek to eliminate potential risks associated with flooding and to eliminate associated adverse ecological impacts This work was completed in 2000 In 2000, EPA modified the UAO to address contamination in Dead Creek This modified UAO required the following removal of sediments from Creek Segments B, C, D, E, F, and Site M and construction of a Toxic Substances Control Act (TSCA) and Resource Conservation and Recovery Act (RCRA)-compliant containment cell In 2001, the UAO was amended to include remediation of contaminated sediments in Creek Segment F and Borrow Pit Lake

The PRPs implemented the UAO, with work beginning in 2000 Under the terms of the UAO, the PRPs, with EPA oversight, constructed a TSCA and RCRA-compliant on-site containment cell adjacent to Dead Creek Segment B Under the UAO, approximately 46,000 cubic yards of sediment were excavated from Dead Creek Segments B, C, D, E, F, and Site M in 2001 and 2002 and placed in the containment cell

After completion of Dead Creek sediment removal, the PRPs sampled creek bottom soils throughout Dead Creek and in Borrow Pit Lake Pursuant to the UAO, the creek bottom soils containing contamination exceeding risk levels were removed and placed in the containment cell in 2005 through 2006 In total, under the UAO, the PRPs removed 5,000 cubic yards of contaminated creek-bottom soil from CS-B through CS-F of Dead Creek and 7,300 cubic yards of contaminated sediment from Borrow Pit Lake Finally, pursuant to the Order, a polysynthetic liner was placed in CS-B, for the purpose of providing further protection from potential leaching from the disposal areas adjacent to the northern portion of CS-B, which might act to re-contaminate this area and the creek This action was completed in 2008

In 1999, EPA also entered into an Administrative Order on Consent (AOC) with PRPs Monsanto Company and Solutia Inc , to conduct a remedial investigation/ feasibility study (RI/FS) to investigate and assess what cleanup remained to be done for the Site after the

[4] Ecology and Environment Inc under Illinois EPA contract conducted the Expanded Site Investigation of the Sauget Area Sites from 1985 to 1987

above referenced removal actions were completed In 1999 to 2000, under the AOC and with EPA and Illinois EPA oversight, the PRPs conducted extensive site investigations of the disposal areas, downgradient groundwater, surface water, air and soil

Between 2002 and 2007, the PRPs conducted follow-up and supplemental investigations related to principal threat waste, treatability of DNAPLs in groundwater, floodplain soils, leachability of Dead Creek soils, and mass flux of contaminants from the landfills to groundwater, as well as extensive assessments of human health and ecological risks EPA also conducted its own investigations in some areas during this period Results of all of these studies were evaluated and compiled into the Final RI/FS Report for Sauget Area 1 dated November 6, 2012

III COMMUNITY INVOLVEMENT ACTIVITIES TO DATE

In 1990, EPA developed a Community Involvement Plan (CIP) for the Sauget Sites The CIP is a required document that EPA uses to address community concerns and expectations, as learned from community interviews The Sauget CIP shares details about the background and history of the Site, clean-up progress, community profile, past community involvement efforts, key community concerns, how EPA will respond to the community's concerns, the information tools that will be used (such as the web), and information repositories The CIP also contains a contacts list of current federal, State, and local officials, information repositories, interested groups, and media contacts

In order to update the information in the 1990 Community Involvement Plan, EPA conducted community interviews in April 2000 and then again in 2009, to assess how much the community knew about the Sites, get area residents' and local officials' concerns about the Sites, and determine what information they wanted EPA to provide them and the best way to disseminate information The results of those interviews were used to produce the revised 2009 CIP for the Sauget Area 1 and Area 2 Sites The CIP's background and history timeline are helpful tools in sharing information and the updated contacts lists are used to set up meeting locations and contacts for meetings

EPA has taken an active role in informing the public of its activities in the Sauget Area Sites During the Dead Creek removal action, EPA, and the PRPs held numerous public meetings and published and disseminated to the community and interested parties frequent updates on the Dead Creek cleanup called "Creekside Commentary" to keep the public informed about the Dead Creek project Before the community interviews in 2009, EPA shared an update about Site activities with the community After the 2009 community interviews, EPA mailed out a fact sheet about completing the Dead Creek clean-up

To keep current with documents in the Administrative Record, an updated CD is sent to the information repository at the Cahokia Public Library when any new document is added to the Administrative Record

IV SITE CHARACTERISTICS

The Sauget Area 1 Site is situated in a floodplain of the Mississippi River called the American Bottoms, and is located in the southwestern section of the American Bottoms floodplain More specifically, it is situated south of East St Louis, and is approximately three-quarters to one mile east of the eastern bank of the Mississippi River The stratigraphy beneath the Site is much like that of the rest of the floodplain The Cahokia Alluvium is about 30 feet thick and exists as a fine silty sand that is gray and brown in color Below this, the unconsolidated deposits of the Henry Formation are present

Locally, the Henry Formation is characterized by medium-to-coarse sand that becomes coarser and more permeable with depth The depth to bedrock (below ground surface) ranges from 140 feet near the river to about 100 feet on the east side of the Sauget Area 1 Site The ground-water level is currently between 10 to 20 feet below ground surface, but fluctuates during times of heavy and light precipitation Figure 2 presents a generalized geologic cross-section

Three distinct hydrogeologic units can be identified in the Sauget Area 1 and Area 2 Sites 1) a shallow hydrogeologic unit (SHU), 2) a middle hydrogeologic unit (MHU), and 3) a deep hydrogeologic unit (DHU) The 30 foot thick SHU includes the Cahokia Alluvium and the uppermost portion of the Henry Formation This unit is primarily unconsolidated, fine-grained silty sand with low to moderate permeability The 40 foot thick MHU is formed by the upper to middle, medium to coarse sand portions of the Henry Formation It contains a higher permeability sand than found in the overlying shallow hydrogeologic unit, and these sands become coarser with depth At the bottom of the aquifer is the DHU, which includes the high permeability, coarse-grained deposits of the lower Henry Formation This zone is estimated to be about 30 to 40 feet thick Groundwater beneath Sauget Area 1 generally flows from east to west, toward the Mississippi River

The RI investigated contaminants in various environmental media, including surface soil, subsurface soil, waste, groundwater, air, surface water, and sediments As indicated, pursuant to EPA's 2000 UAO, sediments were removed from Dead Creek Segments B, C, D, E, F, and Site M, all sediments exceeding site specific risk based concentrations (RBCs) were excavated from Borrow Pit Lake in 2005-2006 Creek bottom soils exceeding site specific RBCs were excavated from Creek Segments B, D, and F in 2005-2006, and an armored impermeable liner was installed throughout the entire length of Creek Segment B These removal actions have eliminated risks to human health and the environment in the Dead Creek, Borrow Pit Lake, and Site M[5]

The remaining contaminant source areas at the Sauget Area 1 Site are the disposal areas at Sites G, H, I South, and L These disposal areas contain municipal and industrial waste materials, including crushed or partially crushed drums, drum fragments, uncontained soil and liquid wastes, wood, glass, paper, construction debris, and miscellaneous trash The lower portion of waste at these Sites is below the water table There is residual DNAPL in the aquifer matrix underlying portions of Sites G, H, and I South The dissolution of

[5] Sauget Area 1 Dead Creek Final Remedy Creek Bottom Soil Human Health Risk Assessment (ENSR Corporation April 2006)

residual DNAPL in the MHU and DHU beneath Sites G, H, and I South is an on-going source of contamination to downgradient groundwater

During the RI, the PRPs conducted a principal threat waste evaluation to determine whether principal threat wastes[6] are located at the Site At Site I South, the DNAPL characterization and remediation study confirmed the presence of pooled DNAPL at bedrock well BR-I and an adjacent piezometer, A1-19, which is located 10 feet from BR-I Figure 3 shows the locations of well BR-I and piezometer A1-19 Pooled DNAPL is a source material and is considered a principal threat waste liquid Principal threat wastes were also identified along Queeny Avenue in subsurface soils contaminated with PCBs and 2,3,7,8-TCDD-TEQ with risks above EPA's principal threat waste threshold of $1x10^{3}$

The RI confirmed that Site I North and Site N are not contaminant source areas Site I North contains inert fill materials such as bricks, pieces of concrete, large concrete slabs, rebar, sheet metal, wood, fill soil, and gravel Site N predominantly contains construction debris and some crushed drums Neither area contains any contamination in soils above levels of concern, e g , containing levels which potentially threaten human health or the environment[7]

V SCOPE AND ROLE OF THE ACTION

The action proposed in this plan, referred to as remedial action for Operable Unit 1 (OU 1), will be the first of two remedial decisions and remedial actions for the Sauget Area 1 Site EPA's overall strategy for cleaning up the Site is to address soil, sediment, surface water and groundwater source contamination through this remedial action for OU1, which will be the final remedy for contaminated soils, sediments, and surface water at the Site Area-wide groundwater contamination resulting from the contaminated soil and groundwater source areas present in the Sauget Area 1 and Sauget Area 2 Sites will be addressed as a separate OU, which will be proposed and set forth in a separate groundwater ROD for the Sauget Area 1 and Sauget Area 2 Sites

VI SUMMARY OF SITE RISKS

Throughout the remedial investigation studies, various human health risk assessments (HHRA) have been conducted by the PRPs, with EPA oversight, for the Sauget Area 1 Site, including the Site-wide HHRA (2001), Dead Creek Bottom Soil HHRA (2006), Vapor Intrusion HHRA (2008), and Utility Corridor HHRA (2008) The PRPs completed these site-specific risk assessments, as required by EPA's 1999 RI/FS AOC signed by the PRPs, for the purpose of quantifying the potential threat to public health and the environment from actual or threatened releases of hazardous substances into the environment The HHRAs were prepared using EPA's Risk Assessment Guidance for Superfund (RAGS) and evaluated potential current and future exposure scenarios at the Site

---

[6] Principal threat wastes are those source materials that are considered to be highly toxic or highly mobile that cannot be reliably contained or would present a significant threat to human health or the environment should exposure occur They include liquids and other highly mobile materials or materials having high concentrations of toxic compounds

[7] Sauget Area 1 – Human Health Risk Assessment (ENSR International June 2001)

A Human Health Risks

To estimate the risk to human health at a Superfund site (i e the likelihood of health problems occurring if no cleanup action is taken at a site) EPA guidance outlines a four-step process

Step 1 Analyze Contamination

Step 2 Estimate Exposure

Step 3 Assess Potential Health Dangers

Step 4 Characterize Site Risk

In Step 1, the risk assessor evaluates the data collected at a particular site to determine which data are appropriate to consider in the risk assessment Next, the risk assessor looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals when human studies are unavailable) Comparisons between site-specific concentrations and concentrations reported in past studies help to determine which contaminants are most likely to pose the greatest threat to human health

In Step 2, the risk assessor considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure Using this information, the risk assessor calculates a reasonable maximum exposure (RME) scenario, which represents the highest level of human exposure that could reasonably be expected to occur

In Step 3, the risk assessor uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks EPA guidance considers two types of risk cancer and non-cancer

The likelihood of one additional lifetime cancer resulting from a Superfund site is generally expressed as an upper bound probability, for example, a 1 in 10,000 chance In other words, for every 10,000 people that could be exposed, one additional cancer case may occur as a result of exposure to site contaminants over a lifetime An additional cancer case means a probability that one more person could get cancer than normally would be expected to from all other causes This is also referred to as an excess lifetime cancer risk (ELCR) because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three As noted above USEPA's generally acceptable ELCR range for site-related exposures is 1 in 10,000 to 1 in 1,000,000

For non-cancer health effects, EPA calculates risk differently The key concept here is that a threshold level exists below which non-cancer health effects are no longer predicted This threshold level is conservatively represented by a reference dose (RfD) An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect Non-cancer risks are calculated as the ratio of potential exposure to the RfD This ratio is referred to as a hazard quotient (HQ) A HQ of greater than 1 indicates an unacceptable risk for adverse non-cancer health effects from a specific COC An example of a non-cancer health effect would be a decrease in function of a vital organ such as

neurological organs, kidneys, liver or reproductive organs The hazard index (HI) is generated by adding the HQs for all COCs that affect the same target organ (e g , liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed An HI of less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely An HI of greater than 1 indicates that site-related exposures may present a risk to human health

In Step 4, the risk assessor determines whether site risks are great enough to cause health problems for people at or near the Superfund site The results of the three previous steps are combined, evaluated and summarized The risk assessor adds up the potential risks from the individual contaminants and exposure pathways and calculates a total site risk

As noted above, as part of the remedial investigation for the Site various HHRAs were prepared The following provides a brief description of the various human health risk assessments conducted in the Sauget Area 1 Site

- **Site-Wide HHRA** PRPs conducted a site-wide HHRA for the Sauget Area 1 Sites (G, H, I, L, N) and seven residential transects (Transects 1-7) in 2001 Site M was not included in the Site-wide HHRA because it was subject to remediation and assessed in the Dead Creek Bottom Soils HHRA (See "Dead Creek Bottom Soils HHRA" below) and no longer posed unacceptable risk to human health or the environment The site-wide HHRA also evaluated portions of Dead Creek Segment F not subject to remediation (see below) and Borrow Pit Lake

- **Vapor Intrusion HHRA** The site-wide HHRA (2001) included an evaluation of potential risks to an indoor worker based on volatilization of constituents in groundwater to indoor air of an overlying hypothetical building Due to the evolving science of vapor intrusion, the vapor intrusion evaluation was updated in 2009 in the Vapor Intrusion HHRA (VI HHRA, AECOM, 2009)

- **Dead Creek Bottom Soils HHRA** The Dead Creek Bottom Soils HHRA assessed the creek bottom soils in Dead Creek segments following the removal of sediments from Dead Creek Segments B, C, D, E, a portion of Creek Segment F, and Site M Confirmation samples were collected and evaluated in the Dead Creek Bottom Soils HHRA (2006)

- **Utility Corridor HHRA** An investigation of subsurface soil in areas along the existing utility lines that are in or adjacent to Sites H and I was conducted in 2007-2008

To guide identification of appropriate exposure pathways for evaluation in the risk assessments, a conceptual site model for human health was developed to identify source areas, potential migration pathways of constituents from source areas to environmental media where exposure can occur, and to identify potential human receptors Potential environmental exposure media include the following

- Fill area waste, surface soil (0- 0 5 ft below ground surface (bgs) and groundwater at Sites G, H, I, L, and N

- Residential transects area groundwater, surface soils (0- 0 5 ft bgs), and subsurface soils (0 5 - 6 ft bgs)
- Dead Creek, Site M, and Burrow Pit Lake sediments
- Dead Creek and Burrow Pit Lake surface water
- Fish caught from the Burrow Pit Lake

1 Identification of Chemicals of Concern

The Site characterization data used in the risk assessment was subjected to standard EPA data validation procedures before they were used in the risk assessment Only data meeting the data validation criteria were used in the risk assessment

Chemicals of potential concern (COPCs) in each potential environmental exposure medium were indentified using a selection process that began with all of the chemicals detected in the various environmental media The lists were then refined by eliminating chemicals unlikely to contribute substantially to site risks

The chemicals identified as COPCs by this process were carried through the risk assessment process Chemicals found to be risk drivers by the risk assessment process were designated as COCs for the site Among the more important COCs at the site are benzene, chlorobenzene, dieldrin, naphthalene, PCBs, and 2,3,7,8-TCDD-TEQ (dioxin) Information about the detection frequency, range of concentrations detected, and the exposure point concentrations used in the risk assessment for the COCs for each medium is presented in more detail in the HHRAs

2 Exposure Assessment

The exposure pathways and receptors considered for evaluation, along with the rationale for their inclusion in, or exclusion from, the quantitative risk assessment are described in the HHRAs Sauget Area I Sites (G, H, I, L, and N) have been used for industrial purposes for many years and use of these areas is expected to remain industrial The sites within Sauget Area 1 are zoned commercial/industrial and it is likely that the sites will continue to be used well into the reasonably foreseeable future for commercial/industrial purposes Therefore, the sites were evaluated for commercial/industrial use scenarios in the site-wide HHRA (ENSR, 2001) However, Site N was evaluated for both a commercial/industrial as well as a hypothetical future residential scenario Receptors were identified for the sites based on the conceptual Site model and the COPCs identified in media in the areas The potential receptor groups considered included

- Sites (G, H, I, L and N)
  - Future indoor industrial workers
  - Future outdoor industrial workers
  - Future construction workers
  - Future utility workers
  - Future trespassing teenagers
  - Future residents (Site N only)
- Residential Transects

- Future outdoor industrial workers
- Future construction workers
- Future residents

- Dead Creek, Borrow Pit Lake, and Site M
  - Current and future recreational child
  - Current and future recreational teen
  - Current and future recreational fishers
  - Current and future construction workers

Further discussion of the reasons for including or excluding particular exposure pathways from the quantitative risk assessment can be found in the HHRAs

3 Toxicity Assessment

Toxicity information used in the HHRA was derived primarily from EPA's Integrated Risk Information System (IRIS) database Toxicological information presented in IRIS represents a consensus opinion of EPA health scientists and has undergone peer review (both internal and external) If no information was provided in IRIS for a given chemical, toxicity values were drawn from EPA's National Center for Environmental Assessment and USEPA Region 3 Risk-Based Concentration Table (USEPA 2005b), as well as from USEPA Region 9 Preliminary Remediation Goal (PRG) Tables and the California Office of Environmental Health Hazard Assessment Further description of the toxicity assessment process can be found in the HHRAs

4 Risk Characterization

As described above, for carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen ELCR was calculated from the following equation

Risk (ELCR) = LADD × SF

where risk = a unitless probability (e g , 2×10^{-5}) of an individual developing cancer
LADD = lifetime average daily dose (mg/kg-day)
SF = slope factor, expressed as (mg/kg-day)$^{-1}$

These risks are probabilities that are usually expressed in scientific notation (e g , 1×10^{-6}) An ELCR of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure

The potential for noncarcinogenic effects was evaluated by comparing an exposure level over a specified time period (e g , lifetime) with a reference dose (RfD) derived for a similar exposure period and calculating HQ and HI as described above

The HQ was calculated as follows

Noncancer HQ = CADD/RfD

where CADD = chronic average daily dose

RfD = reference dose

CADD and RfD are expressed in the same units and represent the same exposure period (i e , chronic, subchronic, or short-term)

The risk estimates presented in the HHRAs for the following areas were within EPA acceptable levels for residential exposure scenarios, and no COCs were identified Therefore, no further remedial actions are warranted at the following areas

- Site M,
- Residential transects adjacent to Dead Creek,
- Dead Creek Segments B through F, including Borrow Pit Lake, and
- Indoor air at buildings within Sauget Area 1

However, based on the results of the site-wide HHRA and Utility Corridor HHRA, cancer risks (expressed as ELCR) and noncancer hazards (expressed as HI) from exposure to contaminated media at the Site where estimates for the RME scenario exceeded EPA-acceptable levels and COCs were identified in the environmental media were identified for the following sites

Site G

- Risk Estimates
  - Construction worker ELCR= $5x10^{-5}$ and HI = 50
- Media, COCs, and Exposure Point Concentration
  - Groundwater - Benzene (0 8 mg/L) and Naphthalene (1 mg/L)
  - Leachate - Benzene (0 8 mg/L), Chlorobenzene (2 8 mg/L), and Naphthalene (1 mg/L)
  - Subsurface soil - Phosphorous (898 mg/kg) and PCBs (4,430 mg/kg)

Site H

- Risk Estimates
  - Construction worker ELCR = $1x10^{-4}$ and HI = 167
  - Utility Worker ELCR = $2x10^{-2}$ and HI = 630
- Media, COCs, and Exposure Point Concentration
  - Soil and waste (utility corridor) - 2,3,7,8-TCDD-TEQ (0 4 mg/kg), 4,4-DDT (760 mg/kg), 4,4-DDD (940 mg/kg), Dieldrin (89 mg/kg), Barium (82,000 mg/kg), Chlorobenzene (6,800 mg/kg), PCBs (8,580 mg/kg)
  - Groundwater - Benzene (2 5 mg/L), Chlorobenzene (2 7 mg/L)
  - Subsurface soil - Manganese (36,500 mg/kg), PCBs (18,000 mg/kg)

Site I North

The HHRA evaluated Site I as one area In the RI, Site I was divided into two areas, Site I North and Site I South, because Site I North was an undisturbed tract at the time that disposal at Site I South ceased operations An evaluation of the potential risk associated with media at Site I was performed for COCs identified in the HHRA to assess whether they would be COCs in Site I North This evaluation concluded that there are no COCs identified for Site I North and constituents detected in media in Site I North are within EPA-acceptable risk levels

Site I South

- Risk Estimates
  - Outdoor industrial worker ELCR = $2x10^{-4}$ and HI = 2
  - Construction worker ELCR within EPA's acceptable risk range and HI = 48
- Media, COCs and Exposure Point Concentration
  - Surface soil - 2,3,7,8-TCDD-TEQ (0 012 mg/kg) and PCBs (121 mg/kg)
  - Subsurface soil – PCBs (343 mg/kg) and antimony (6,660 mg/kg)
  - Leachate – PCBs (0 108 mg/L), chlorobenzene (0 95 mg/L), chloroform (0 026 mg/L), naphthalene (2 5 mg/L), and MCPP (34 mg/L)

Site L

- Risk Estimates
  - Construction worker ELCR within EPA's acceptable risk range and HI = 5
- Media, COCs and Exposure Point Concentration
  - Subsurface soil – PCBs (500 mg/kg)

Site N

- Risk Estimates (Based on updated dioxin RfD in 2012)
  - Resident ELCR within EPA's acceptable risk range and HI = 3
- Media, COCs and Exposure Point Concentration
  - Surface soil - 2,3,7,8-TCDD-TEQ ($3\ 45 \times 10^{-4}$ mg/kg)

B Summary of Ecological Risk

The PRPs conducted two ecological risk assessments, with EPA oversight, under the RI/FS AOC signed in 2001 for Sauget Area 1 The first ecological risk assessment, conducted in 2001, focused on the floodplain soils, surface water, and sediments associated with Dead Creek Segment F, including Borrow Pit Lake and floodplain soil associated with upstream segments of Dead Creek This ecological risk assessment concluded clean-up was required Clean-up of Dead Creek and Borrow Pit Lake was conducted as discussed in the "Clean-up Activities to Date" section above

The second ecological risk assessment, conducted in 2002, evaluated potential impacts to fish and wildlife due to exposure to residual chemicals of concern in creek bottom soils after the 2001 removal action A terrestrial evaluation of the de-watered creek bottom soils of Dead Creek segments C, D, and E was completed in 2009 The Site specific ecological evaluation concludes that further remedial action within Dead Creek, Borrow Pit Lake, and floodplain soil associated with upstream segments of Dead Creek is not necessary

VII REMEDIAL ACTION OBJECTIVES

It is EPA's judgment that the preferred alternative identified in this Proposed Plan is necessary to protect public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment by meeting the remedial action objectives

Remedial Action Objectives (RAOs) are general descriptions of the goals established for protecting human health and the environment, to be accomplished through remedial actions RAOs normally identify the medium of concern, contaminants of potential concern (COPCs), allowable risk levels, potential exposure routes, and potential receptors

The following RAOs have been identified for the Sauget Area 1 Site based on the summary of receptor risks and hazards for the exposure scenarios presented in the baseline HHRA

Site G

- Prevent unacceptable risks to human receptors (construction workers, utility workers) resulting from inhalation of COCs found in groundwater and leachate during excavation work
- Prevent unacceptable risks to human receptors (construction workers, utility workers) resulting from ingestion and dermal contact with subsurface soils during excavation work
- Prevent human exposure to vapor intrusion into indoor air at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater
- Prevent unacceptable risk to human receptors related to landfill gas generation
- Minimize current and future migration of COCs from soil and waste to groundwater at levels causing unacceptable risks to human receptors
- Minimize migration of principal threat/mobile source material

Site H

- Prevent unacceptable risks to human receptors (construction workers, utility workers) resulting from inhalation of COCs found in groundwater, leachate, and subsurface soils during excavation work
- Prevent unacceptable risks to human receptors (construction workers, utility workers) resulting from ingestion and dermal contact with leachate and subsurface soils during excavation work
- Prevent unacceptable risks to human receptors (utility workers) resulting from inhalation of COCs found in soil vapor and waste during excavation work on utility lines
- Prevent human exposure to vapor intrusion into indoor air at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater
- Prevent unacceptable risks to human receptors (utility workers) resulting from ingestion or dermal exposure to COCs found in waste materials and soil during excavation work on utility lines
- Prevent unacceptable risk to human receptors related to landfill gas generation
- Minimize current and future migration of COCs from soil and waste to groundwater at levels causing unacceptable risks to human receptors
- Minimize migration of principal threat/mobile source material

Site I South

- Prevent unacceptable risks to human receptors (outdoor industrial/construction workers) resulting from ingestion or dermal exposure to COCs found in surface soils
- Prevent unacceptable risks to human receptors (construction workers) resulting from ingestion or dermal exposure to COCs found in surface and subsurface soils and leachate during excavation work
- Prevent unacceptable risks to human receptors (construction workers) resulting from inhalation of COCs found in leachate during excavation work
- Prevent human exposure to vapor intrusion into indoor air at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater
- Prevent unacceptable risk to human receptors related to landfill gas generation
- Minimize current and future migration of COCs from soil and waste to groundwater at levels causing unacceptable risks to human receptors
- Minimize migration of principal threat/mobile source material

Site L

- Prevent unacceptable risks to human receptors (construction workers) resulting from ingestion or dermal exposure to COCs found in subsurface soils during excavation work

Site N

- Prevent unacceptable risks to human receptors (construction workers/residents/ trespassing teenagers) resulting from ingestion or dermal exposure to COCs found in surface soils

VI DESCRIPTION OF ALTERNATIVES

As outlined above in this Proposed Plan, several significant removal actions have already been implemented in Sauget Area 1 Although these prior actions have addressed unacceptable risks in the Area (primarily formerly existing in Dead Creek), other risks remain To address these remaining risks, EPA presents the remedial alternatives for the Sauget Area 1 Site below The alternatives are numbered to correspond with the numbers in the RI/FS Report (November 2012)

Common Elements - All of the alternatives, except the "no action" and Alternative 2, which does not include engineered covers, require the following common elements

Engineered Covers - Engineered covers minimize the potential for exposure to COCs in soils and waste in covered areas The types of engineered covers selected for a remedial alternative will vary depending on the existing uses of the Sites and the types of fill or waste materials that are present at the Sites The cover designs will also vary depending on whether or not the alternative includes technologies that introduce air into the saturated

zone beneath the capped area (e g , biosparging) Permeable covers are more appropriate in these situations

The types of engineered covers included in the remedial alternatives for the Sauget Area 1 Sites include RCRA Subtitle C caps, 35 Illinois Administrative Code (IAC) 724 compliant soil caps, 35 IAC 724 compliant crushed rock caps, and asphalt caps

RCRA Subtitle C caps are multi-layer caps that promote surface water drainage and minimize surface water infiltration They include a low- permeability layer underlain by a gas collection layer and overlain by a drainage layer and protective soil cover and vegetative layer At traffic areas, the surface layer of a RCRA Subtitle C cap can be constructed of alternate materials such as crushed rock or asphalt pavement

A 35 IAC 724 compliant soil or crushed rock cap will meet the performance standards of RCRA Subtitle C cap, except the component requiring long-term minimization of migration of liquids is not appropriate for the Sauget Area 1 Sites (See below "Compliance with ARARs") Therefore the 35 IAC 724 compliant caps will not include the low-permeability component of the RCRA Subtitle C designed caps

Both the soil and crushed rock caps will use clean material to minimize potential for exposure to COCs in soil and waste Both caps would require a minimum of two feet of suitable material Crushed rock caps will use granular material to cover an area The granular material can be free-draining or less permeable material, depending on site-specific conditions

Details of the engineered cover designs for Sauget Area 1 would be developed during the remedial design process Specifications would include details regarding the extent of the engineered covers ensure the protectiveness of the caps

Containment Cell Operation and Maintenance (O&M) - The existing containment cell is a RCRA and TSCA-compliant containment cell that was constructed as part of the Dead Creek Removal Action ordered by EPA in 2001 and is located immediately west of Creek Segment B and south of Site G The materials that were placed in the containment cell included sediments and creek-bottom soils excavated from Dead Creek and the Borrow Pit Lake

The required activities relating to the O&M of the containment cell are detailed in the Containment Cell Operation and Maintenance Plan (Golder, 2008) The O&M activities include the following i) regular inspections of the cap, ii) sampling of primary and secondary leachate with analysis for pH, specific conductance, PCBs, and chlorinated VOCs, iii) collection and treatment of leachate, iv) quarterly sampling of treatment system effluent with analysis for VOCs, SVOCs, PCBs, and metals, v) quarterly sampling of selected monitoring wells with analysis for VOCs, PCBs, and metals, and vi) maintenance and repairs as needed (e g , replacement or repair of pumps and mowing, fertilizing, and re-seeding of cell cap)

Monitoring Well Network- The monitoring well network involves installation of a monitoring well network and periodic groundwater sampling and testing for VOCs, SVOCs, and selected geochemical parameters The exact number and location of wells in the groundwater monitoring network will be established during the remedial design phase

Institutional Controls – Institutional controls are designed to control access to the Site, manage construction or other intrusive activities that may disturb soil or waste, minimize potential exposure to COCs, and ensure that groundwater is not used for drinking water purposes Institutional controls that could be implemented include deed restrictions, zoning restrictions and access restrictions such as fences or warning signs At a minimum, institutional controls will be implemented in accordance with the Illinois Uniform Environmental Covenant to restrict residential development of the Site Consistent with expectations set out in the Superfund regulations, none of the remedies rely exclusively on institutional controls to achieve protectiveness A detailed description of the institutional controls for Sauget Area 1 will be developed in an Institutional Controls Implementation Plan to be prepared during the remedial design process

ALTERNATIVE 1

- **No Action**

Estimated Capital Cost $0
Estimated Total O&M Cost $0
Estimated Present Worth Cost $0
Estimated Construction Timeframe None

Regulations governing the Superfund program require that the "no action" alternative be evaluated to establish a baseline for comparison Under this alternative, EPA would take no action at the Site to prevent exposure to the soil and groundwater source contamination

ALTERNATIVE 2

- **Containment Cell O&M**
- **Monitoring Well Network**
- **Institutional and Access Controls Sites G, H, I South, and L**

Estimated Capital Cost $524,895
Estimated Total O&M Cost $2,517,460
Estimated Present Worth Cost $3,102,610
Estimated Construction Timeframe 3-6 months

This alternative combines institutional controls, the operation and maintenance of the containment cell, and the installation and operation of a monitoring well network, all of which were described under "Common Elements" above

ALTERNATIVE 3

- **Pooled DNAPL Recovery at Site I South**
- **RCRA Subtitle C Caps at Sites G, H, I South, and L**
- **Asphalt Pavement at Site G West**
- **Utility Relocation**
- **Containment Cell O&M**
- **Monitoring Well Network**
- **Institutional and Access Controls Sites G, H, I South, and L**

Estimated Capital Cost $9,098,788
Estimated Total O&M Cost $3,660,803
Estimated Present Worth Cost $12,819,844
Estimated Construction Timeframe 1 year

Alternative 3 combines the components of Alternative 2 with pooled DNAPL recovery at Site I South, RCRA Subtitle C caps at Sites G, H, I South, L, and utility relocation

Institutional controls, containment cell O&M, and the installation and operation of a monitoring well network were described under "Common Elements" above The additional components of Alternative 3 are described below

Pooled DNAPL Recovery at Site I South - This is a removal technology that involves recovery of an accumulation of DNAPL that is pooled at the base of a water-bearing zone The DNAPL is pumped from an extraction well and collected in a tank When a sufficient volume has accumulated in the tank, the DNAPL is transported off-site for disposal at a permitted facility

Pooled DNAPL recovery at Site I South bedrock well (BR-I) has already been performed on an every-other-week schedule since November 2008 DNAPL serves as a large and significant source of dissolved contaminants to the groundwater plumes Removal of the pooled DNAPL will therefore help reduce the time it takes for the plume to be remediated Implementation of this remedy component will involve bringing a permanent electrical power source to BR-I, programming the pump controller for automated operation, and obtaining a larger tank for storage of the recovered fluids

Initially, the pump will be operated once per day When the rate of DNAPL recovery has diminished sufficiently to the point that daily operation has limited effectiveness, the pump will be operated twice per week When recovery using the weekly schedule has reached its limit of effectiveness, the DNAPL removal will be conducted once per month When the limit of practicable recovery has been reached, the DNAPL recovery will be discontinued Fluid levels will be monitored at BR-I and at nearby well A1-19 Recovered DNAPL will be transported to an approved off-site facility for incineration

Under this action, the extent of pooled DNAPL in bedrock in the area surrounding BR-I will be investigated during the remedial design phase of the project Recovery of pooled DNAPL from additional bedrock wells in the area of BR-I would be performed if this action is determined to be productive based on the results of this investigation

The pooled DNAPL that is present at Site I South is considered a principal threat waste material The pooled DNAPL recovery component will address this principal threat waste material and reduce the mass of COCs in the source area at Site I South

RCRA Subtitle C Caps at Sites G, H, I South, and L -This component involves installation of impermeable caps whose designs would vary depending on the current and future uses of the sites Capping mitigates the potential for direct contact with or release of waste at these sites, and mitigates the potential for subsurface leachate generation where leachable waste is present.

At Site G, a RCRA Subtitle C landfill cap would be installed at the northern portion of the fenced area as shown on Figure 4 The conceptual footprint of the RCRA Subtitle C cap within the fenced

area corresponds to the approximate extent of waste and fill based on boundary trenching conducted during the RI Waste was not found in the southern portion of the fenced area at Site G, and therefore the cap would not need to cover that area At Site G West, asphalt pavement would be installed to cap the existing parking area surrounding the Wiese Engineering building

At Site H, which is an undeveloped property, capping under this alternative would involve installation of a RCRA Subtitle C cap for the entire area of Site H, as shown on Figure 4 The conceptual footprint of the RCRA subtitle C cap at Site L is shown on Figure 4

Site I South is located at an active industrial facility, Cerro Flow Products Capping would involve installation of a RCRA Subtitle C cap for the area of Site I South as shown on Figure 5 Site I South is used for truck trailer parking and has two roads, a rail spur, truck scales, and a guard shack within its boundary In addition, the eastern side of Cerro's employee parking lot is located within the boundary of Site I South The site is covered by clean, purchased stone or surplus concrete that was placed to fill depressions and maintain grades for truck trailer parking

Under this Alternative, the RCRA Subtitle C cap at Site I South would need to incorporate the existing features of the site, and in some locations (such as the rail spur) existing stone/concrete pavement will have to serve as the final cover Considering the present and future use of Site I South for truck trailer parking, the final surface layer of the installed cap would be crushed stone instead of a protective soil cover and vegetated layer

The cap designs for Sites G, H, I South, and L would each provide for the management of stormwater runoff

Utility Relocation - This component includes the following i) relocation of a water supply line that runs through Site I South to the Sauget Village Hall, ii) relocation of a 14-inch diameter fuel pipeline that is located in the utility corridor along Queeny Avenue adjacent to Site H, and iii) relocation of a buried telephone cable located in the utility corridor along Queeny Avenue adjacent to Site H The replacement water line and fuel pipeline will be placed along alternative corridors routed around the fill areas The replacement telephone line will either be placed along an alternative corridor routed around the Sauget Area 1 fill areas or installed on overhead poles

Relocation of these utilities will prevent utility workers performing repair or maintenance activities from potentially coming into contact with wastes in Site I South and the principal threat waste that was encountered in the utility corridor adjacent to Site H

ALTERNATIVE 4

- **Pooled DNAPL Recovery at Site I South**
- **RCRA Subtitle C Caps at Sites G, H, I South, and L**
- **Asphalt Pavement at Site G West**
- **Leachate Control at Sites G, H, and I South**
- **Utility Relocation**
- **Containment Cell O&M**
- **Monitoring Well Network**
- **Institutional and Access Controls Sites G, H, I South, and L**

Estimated Capital Cost $10,891,077
Estimated Total O&M Cost $11,560,817
Estimated Present Worth Cost $22,546,242
Estimated Construction Timeframe 1 year

Institutional controls, containment cell O&M, and installation and operation of monitoring well network were described under "Common Elements" above Pooled DNAPL recovery, engineered caps and utility relocation were described under Alternative 3 above The additional component in Alternative 4 is leachate control at Sites G, H, and I South

Leachate Control - The leachate control component would be implemented following, or in conjunction with, the installation of the RCRA Subtitle C caps at Sites G, H, and I South It would include installation of a grid of wells and installation of leachate pre-treatment systems at Sites G, H, and I South to capture and treat recovered leachate prior to discharging it to the American Bottoms Regional Treatment Facility, where it would be treated further prior to subsequent discharge into the Mississippi River in compliance with the facility's NPDES permit

Prior to designing implementation of this action, a pre-design investigation would be required to identify any areas where the base of the waste is above the saturated zone, leachate recovery wells would not be installed in those areas The leachate recovery wells will be screened across the entire saturated thickness of the fill areas and would be equipped with air-activated recovery pumps that operate only when fluids are present

ALTERNATIVE 5

- **Pooled DNAPL Recovery at Site I South**
- **Pulsed Air Biosparging at DNAPL Areas at Sites G, H, and I South**
- **35 IAC 724 Compliant Soil or Crushed Rock Caps at Sites G, H, I South, and L**
- **Asphalt Pavement at Site G West**
- **Utility Relocation**
- **Containment Cell O&M**
- **Monitoring Well Network**
- **Institutional and Access Controls Sites G, H, I South, and L**

Estimated Capital Cost $8,315,471
Estimated Total O&M Cost $6,310,857
Estimated Present Worth Cost $14,784,465
Estimated Construction Timeframe 1 year

Institutional controls, containment cell O&M, and installation and operation of a monitoring well network are described under "Common Elements" above Pooled DNAPL recovery at BR-I and utility relocation were described under Alternative 3 The additional components in Alternative 5 are pulsed air biosparging at the DNAPL areas at Sites G, H, and I South and the installation of 35 IAC 724 compliant soil or crushed rock caps at Sites G, H, I South and L instead of the impermeable RCRA Subtitle C caps described in Alternatives 3 and 4

Pulsed Air Biosparging at DNAPL Areas at Sites G, H, and I South - The operation of the pulsed air biosparging (PABS) systems would be characterized by high flow rate pulsed sparging of atmospheric air to promote in-situ aerobic biodegradation and thereby reduce the mass of COCs in the MHU and DHU Each system would include a grid of nested injection well pairs screened in the MHU and DHU and connected to a compressor to supply atmospheric air The well grids would be located in the areas of residual DNAPL in the MHU and DHU that were identified at Sites G, H, and I South during the DNAPL characterization and remediation study, as shown on Figure 3

The area of residual DNAPL at Site I South extends beneath former Creek Segment A and into an area of the Cerro facility where several buildings are located These areas with buildings are not suitable for implementation of PABS systems due to the presence of the buildings and the presence of an impermeable liner at the base of former Creek Segment A, which was closed and remediated in 1990-1991 This is because soil vapors will tend to accumulate in the waste and fill materials in the unsaturated zone beneath the impermeable barriers such as a building foundation or landfill liner, or cause the release of vapors into buildings The balance of Site I South that is underlain by residual DNAPL would be treated with pulsed air biosparging

At the location of each sparge well pair there would also be a passive vent well to recover vapors that would be treated in drums of granular activated carbon Each drum of granular activated carbon would serve several passive vent wells

To evaluate the feasibility and effectiveness of full-scale operations of the PABS system, a pilot test would be conducted for a period of approximately one year to determine operational parameters, measure performance characteristics, and verify the optimal spacing of the biosparge well pairs

35 IAC 724 Compliant Soil Cap or 35 IAC 724 Compliant Crushed Rock Caps at Sites G, H, I South, and L - A 35 IAC 724 compliant cap will meet the performance standards of a fully designed RCRA Subtitle C cap, except the component requiring long-term minimization of migration of liquids is not appropriate for the Sauget Area 1 Sites (See below "Evaluation of Alternatives, 2) Compliance with ARARs") Therefore the 35 IAC 724 compliant caps will not include the low-permeability component of the RCRA Subtitle C designed caps Alternative 5 includes 35 IAC 724 compliant soil or crushed rock caps at Sites G, H, I South, and L to prevent exposure to the waste and affected soils while providing permeability for air transfer and infiltration of moisture Soil or crushed rock caps are more appropriate for use with the PABS systems than impermeable RCRA Subtitle C designed caps As mentioned, this is because soil vapors will tend to accumulate in the waste and fill materials in the unsaturated zone beneath an impermeable barrier such as a Subtitle C designed cap The conceptual footprint of the soil or crushed rock caps at Sites G, H, I South, and L are shown on Figures 4 and 5

Under this Alternative, at Site G, the soil or crushed rock cap would be constructed at the northern portion of the fenced area as shown on Figure 4 The conceptual footprint of the soil or crushed rock cap within the fenced area corresponds to the approximate extent of waste and fill discovered to exist based on boundary trenching conducted during the RI Waste was not found in the southern portion of the fenced area at Site G, and therefore the soil or crushed rock cap would not include that area The cross sections of the soil or crushed rock cap for Site G are shown on Figure

6 At Site G West, asphalt pavement would be installed to cap the parking area surrounding the Wiese Engineering building

At Site H, which is an undeveloped property, the soil or crushed rock cap would include the entire area of Site H as shown on Figure 4

At Site I South a crushed rock cap would be constructed instead of a soil cap so that Site I South can continue to be used for truck trailer parking The crushed rock cap at Site I South would need to incorporate the existing features of the Site, and in some locations the existing pavement may need to serve as the final cover The conceptual footprint of the Site I South crushed rock cap is shown on Figure 5 The cross section of the crushed rock cap for Site I South is shown on Figure 6

VII EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration The nine evaluation criteria are described below The "Detailed Analysis of Alternatives "can be found in the Feasibility Study

Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment

Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations and other requirements that pertain to the site, or whether a waiver is justified

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services

Cost includes estimated capital and annual operation and maintenance costs, as well as present worth cost Present worth cost is the total cost of an alternative over time in terms with today's dollar value Cost estimates are expected to be accurate within a range of +50 and -30 percent

State/Support Agency Acceptance considers whether the State agrees with EPA's analysis and recommendations, as described in the Proposed Plan

Community Acceptance considers whether the local community agrees with EPA's analysis and preferred alternative Comments received on the Proposed Plan are an important indicator of community acceptance

A COMPARISON OF ALTERNATIVES TO THE NINE CRITERIA

The comparative analysis of the remedial alternatives is presented below

1 Overall Protection of Human Health and the Environment

This evaluation criterion assesses whether each remedial alternative protects human health and the environment This assessment focuses on how an alternative achieves protection over time and indicates how each source of contamination would be minimized, reduced, or controlled through treatment, engineering, or institutional controls The evaluation of the degree of overall protection associated with each alternative is based largely on the exposure pathways and scenarios set forth in the baseline human health risk assessment (HHRA)

Alternatives 1 and 2 are not protective of human health or the environment because they do not meet the RAOs developed for the affected soils and waste at Sites G, H, and I South

The engineered caps included in Alternatives 3, 4, and 5 achieve the RAO for surface and subsurface soil and the RAO for waste and leachate These engineered caps, in conjunction with the institutional controls, minimize the potential for human exposure to COCs at the fill area and prevent erosion of the fill areas

Alternatives 3 and 4 achieve the soil vapor RAO Alternative 5 can achieve the soil vapor RAO provided that soil vapors generated during operation of the PABS systems are carefully monitored and the PABS operations are managed so as to prevent potential unacceptable risks to indoor workers in nearby buildings

Because Alternatives 1 and 2 are not protective of human health and the environment, they are eliminated from consideration under the remaining eight criteria

2 Compliance with ARARs

Alternatives 3 through 5 can be designed and implemented to comply with ARARs relating to closure and post-closure requirements for landfills, specifically 35 IAC 724, which contains the standards for owners and operators of hazardous waste treatment, storage, and disposal facilities Although the 35 IAC 807 standards for solid waste landfills are relevant to Sauget Area 1, they are not appropriate because the hazardous waste landfill requirements of 35 IAC 724 are better suited to site conditions

The engineered covers in Alternatives 3, 4, and 5 all comply with 35 IAC 724's performance standards of functioning with minimal maintenance, promoting drainage, and minimizing erosion of the cap, and could accommodate settling and subsidence so that the cap's integrity is maintained However, 35 IAC 724's performance standard for providing long-term minimization of migration of liquids (the RCRA Subtitle C cap proposed in Alternatives 3 and 4) is not appropriate for Sauget Area 1 because of the following

- Results from a mass flux evaluation indicates that estimated mass flux of key COCs from leaching of unsaturated source materials is small compared to estimated mass flux of the COCs due to lateral groundwater flow,
- The lower portion of waste at the Sauget Area 1 sites is below the water table Installation of caps to minimize infiltration of rainwater at Sauget Area 1 would not address the flushing effects from the rising and falling water table,
- No principal threat liquids or mobile source materials were identified in the wastes above the water table at the Sauget Area 1 sites, and
- Impacted groundwater at Sauget Area 1 is captured by the Sauget Area 2 Groundwater Migration Containment System

Alternatives 3, 4, and 5 provide for the closure of the Sauget Area landfills which either complies with or meets the substantive requirements of 35 IAC 724 22(b), which requires that the closure controls, minimizes, or eliminates to the extent necessary to adequately protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous decomposition products to the ground or surface or to the atmosphere

Alternative 3, 4, and 5 will comply with the ARARs related to PCB remediation wastes and TSCA risk-based disposal method

3 Long-term Effectiveness and Permanence

The evaluation of alternatives under this criterion addresses the results of a remedial action in terms of the risk remaining at the site after response objectives have been met Alternatives 3, 4, and 5 are effective, permanent remedial alternatives that meet the RAOs for Sauget Area 1 Alternatives 3 and 4 provide a similar measure of long-term effectiveness and permanence after construction of the engineered covers is complete Alternative 5 provides a higher degree of long-term effectiveness by reducing COC concentrations in the MHU and DHU underlying the source areas

4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

This evaluation criterion addresses the statutory requirement for selecting remedial actions that employ treatment technologies that reduce the toxicity, volume, or mobility of the hazardous constituents present in the impacted media

Alternative 3 includes off-site incineration of the pooled DNAPL recovered from Site I South, which is treatment to reduce the toxicity, mobility, and volume of this principal threat material

Alternative 4 includes off-site incineration of the pooled DNAPL recovered from Site I South, plus the capture and treatment of leachate The additional treatment brought about by the leachate control component of Alternative 4 provides a relatively limited reduction in mobility and volume of COCs in the fill areas at Sites G, H, and I South

Alternative 5 includes off-site incineration of the pooled DNAPL recovered from Site I South, plus extensive in-situ aerobic biodegradation of COCs in areas of Sites G, H, and I

South using PABS systems targeting the residual DNAPL areas in the MHU and DHU Alternative 5 provides a significantly higher degree of treatment compared to Alternatives 2, 3, and 4 As much as 230,000 kg of contaminants would be treated under Alternative 5

5 Short-term Effectiveness

This evaluation criterion addresses the effects of the alternatives during the construction and implementation phases (i e , remediation risks) until the RAOs are met

Short-term risks associated with implementation of Alternative 3, 4, and 5 are typical of a construction project that involves construction of engineered covers These risks include general risks to construction workers as well as risks to the community due to significant truck traffic needed to bring the large volume of fill and cover material to Sites G, H, I South, and L Other risks include the potential for dust emissions or stormwater runoff from areas of affected soils or waste during construction of the cover

The potential risks to the community due to dust emissions and stormwater runoff can be managed through measures that will be developed during remedial design The potential risks to site workers during remedy implementation can be managed by requiring adequate personal protection equipment (PPE) and routine safety procedures that will be specified in a health and safety plan to be developed during remedial design

6 Implementability

Alternative 3 would be readily implementable at Sites G, H, I South, and L However, construction of a RCRA Subtitle C cap at Site I South would be difficult to implement and would be disruptive to current operations Site I South is located at an active industrial facility Site I South is used for truck trailer parking and has two roads, a rail spur, truck scales, and a guard shack within its boundary (see Figure 5) In addition, the eastern side of the facility's employee parking lot is located within the boundary of Site I South Installation of a RCRA Subtitle C cap at Site I South would significantly change the topography of the site and would likely result in a reduction of the usable area of the site available for truck trailer parking

Alternative 4 would be readily implementable at Sites G, H, I South, and L At Site I South, however, the construction of a RCRA Subtitle C cover and installation of an extensive grid of leachate recovery wells would be difficult to implement and would be disruptive to current operations

Alternative 5 would be readily implementable at Sites G, H, I South and L However, implementation of the PABS component involves installation of underground piping The PABS system would require a network of underground piping to deliver compressed air to the sparge wells and to route recovered vapors from the passive vapor wells to centrally located equipment compounds The excavation activities would be disruptive to current operations at Site I South

7 Cost

The estimated present value cost for Alternative 2 is $3 1 million, Alternative 3 is $12 8 million, Alternative 4 is $22 5 million, and Alternative 5 is $14 8 million

8 State/Support Agency Acceptance

The State of Illinois supports the Preferred Alternative

9 Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD for the site

B PRINCIPAL THREAT WASTES

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site whenever practicable (NCP Section 300 430(a)(1)(iii)(A)) The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure Contaminated groundwater generally is not considered to be a source material, however, Non-Aqueous Phase Liquids (NAPL) in groundwater may be viewed as source material Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element

To protect human health and the environment, a combination of methods will be used to address principal threat wastes and low-level threat wastes in Alternatives 3, 4, and 5 Principal threat wastes have been identified in the pooled DNAPL that is present at Site I South and along Queeny Avenue in subsurface soils contaminated with PCBs and 2,3,7,8-TCDD-TEQ with risks above EPA's principal threat waste threshold of 1x10-3 Alternatives 3, 4, and 5 addresses these areas by treating the pooled DNAPL by off-site incineration of the pooled DNAPL recovered from Site I South, and by relocating the utilities in the utility corridor to prevent unacceptable risk to utility workers during excavation work

To address the remaining low-level threat waste, engineering controls will be used Engineered covers meeting the requirements of 35 IAC 724 compliant caps will be installed over Sites G, H, I South, and L

VIII PREFERRED ALTERNATIVE

The Preferred Alternative for cleaning up the Sauget Area 1 Site is Remedial Alternative 5-pooled DNAPL recovery at Site I South, pulsed air biosparging at DNAPL areas at Sites G, H, and I South, 35 IAC 724 compliant soil or crushed rock caps at Sites G, H, I South and L, asphalt pavement at Site G West, containment cell operation and maintenance, monitoring well network, utility relocation, and institutional and access controls at Sites G, H, I South, and L

If the pilot study concludes PABS is not feasible, the contingent remedy will be Alternative 3

The Preferred Alternative was selected over other alternatives because it is expected to achieve substantial and long-term risk reduction through treatment, it is expected to prevent future exposure to currently contaminated soils and groundwater, and it is expected to

allow the property to be used for the reasonably anticipated future land use, which is industrial (see Table 1) The Preferred Alternative also reduces the risk within a reasonable time frame at less cost and provides for long-term reliability of the remedy

Based on the information available at this time, EPA and the State of Illinois believe the Preferred Alternative would be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable Because it would treat the source materials constituting principal threats, the remedy also would meet the statutory preference for the selection of a remedy that involves treatment as a principal element The Preferred Alternative can change in response to public comment or new information In addition, if the pilot study concludes PABS is not feasible, the contingent remedy will be Alternative 3

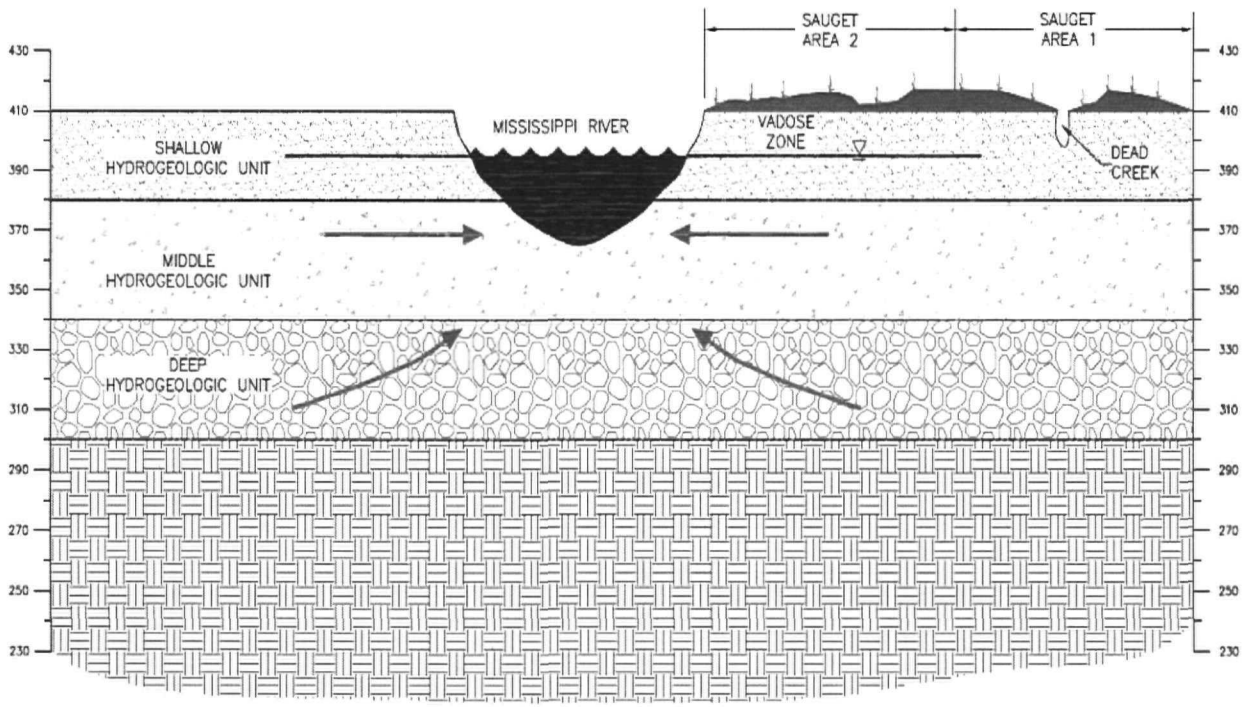
IX Community Involvement

EPA and Illinois EPA provide information regarding the clean-up of the Sauget Area 1 Site to the public through public meetings, the Administrative Record file for the Site, the Site Information Repository maintained at the Cahokia Public library, and announcements published in the *Belleville News-Democrat* EPA and the State encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site

The dates for the public comment period, the date, location, and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan

Figure 1: Sauget Area 1

Figure 2: Generalized Geologic Cross Section



LEGEND

- FINE TO MEDIUM SAND (SM,SP)
- MEDIUM TO COARSE SAND (SW)
- MEDIUM TO COARSE SAND AND GRAVEL (SW,GW)
- BEDROCK
- GROUND-WATER FLOW DIRECTION
- GROUND-WATER TABLE

VERTICAL 40 0

1,000 HORIZONTAL

Title: **GENERALIZED GEOLOGIC CROSS SECTION REMEDIAL INVESTIGATION REPORT SAUGET AREA 1**

SAUGET AND CAHOKIA, ILLINOIS

Prepared For: SOLUTIA

ROUX ASSOCIATES, INC. Environmental Consulting & Management

Compiled by: RC	Date: 2/27/09	FIGURE
Prepared by: JSG	Scale: AS SHOWN	2-1
Project Mgr: MH	Office: NJ	
File No: [illegible]	Project: [illegible]	

Figure 3: Conceptual Biosparge Well Locations

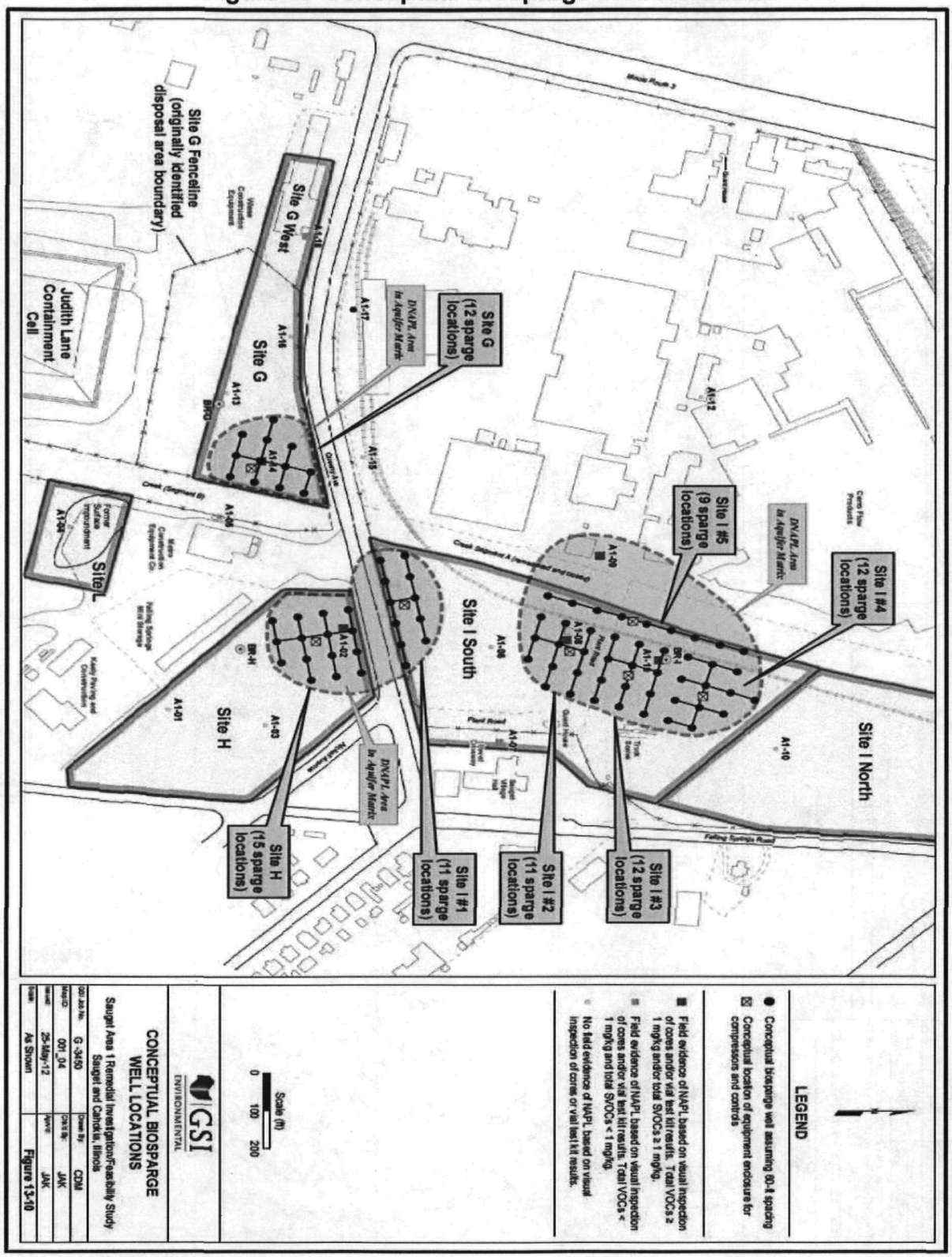


Figure 4: Conceptual Cap Areas at Sites G, H, and L

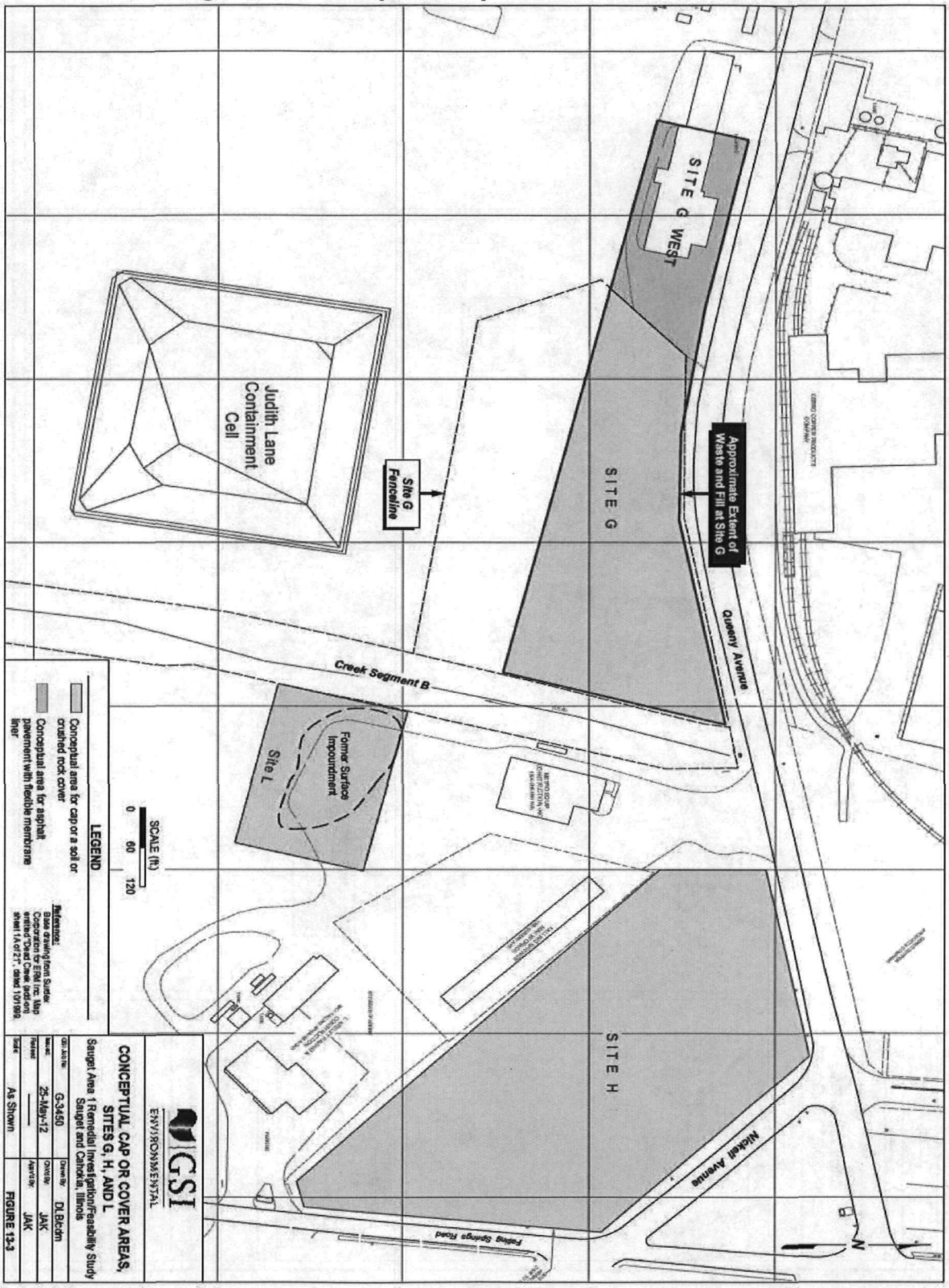


Figure 5: Conceptual Cap Area at Site I South

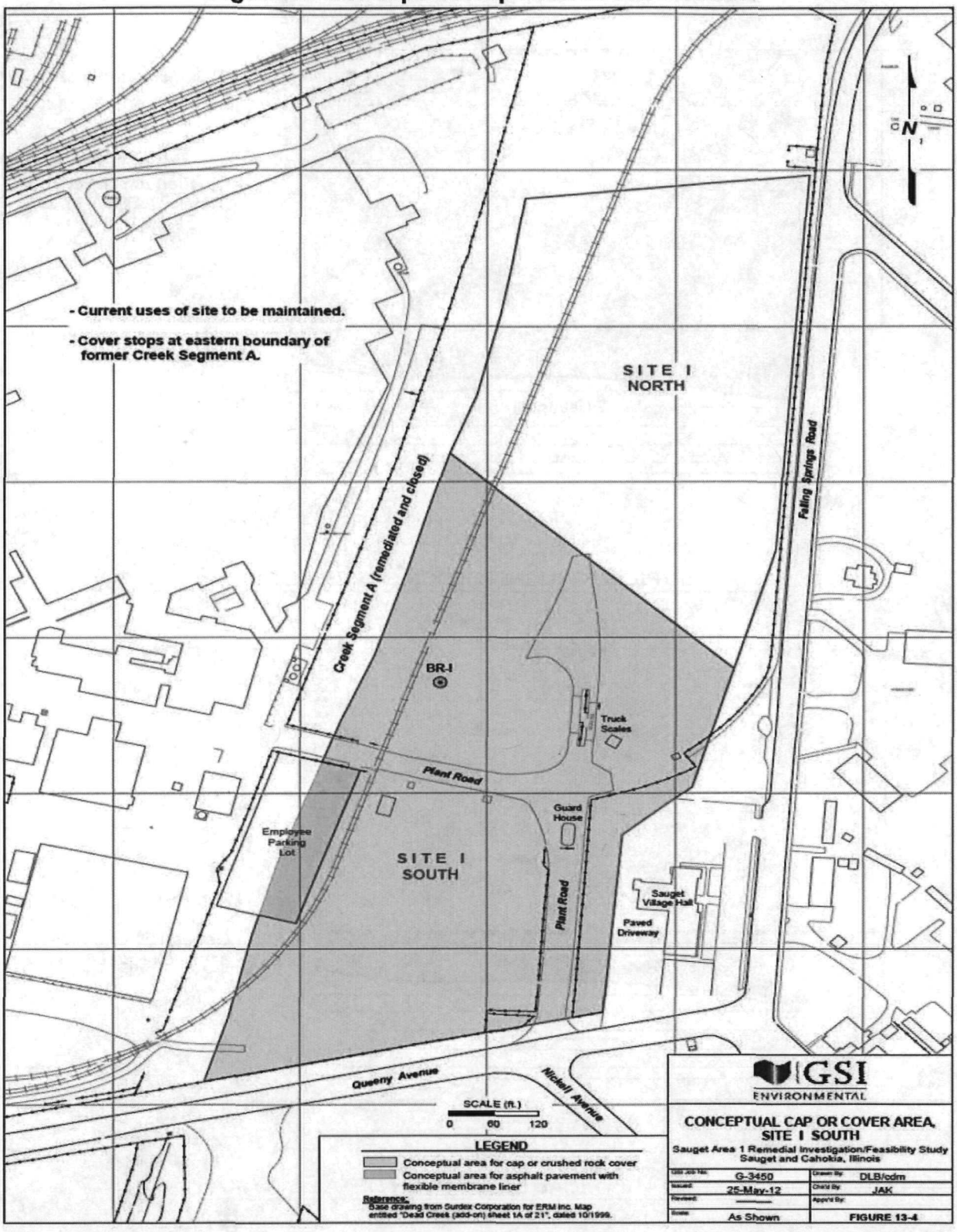
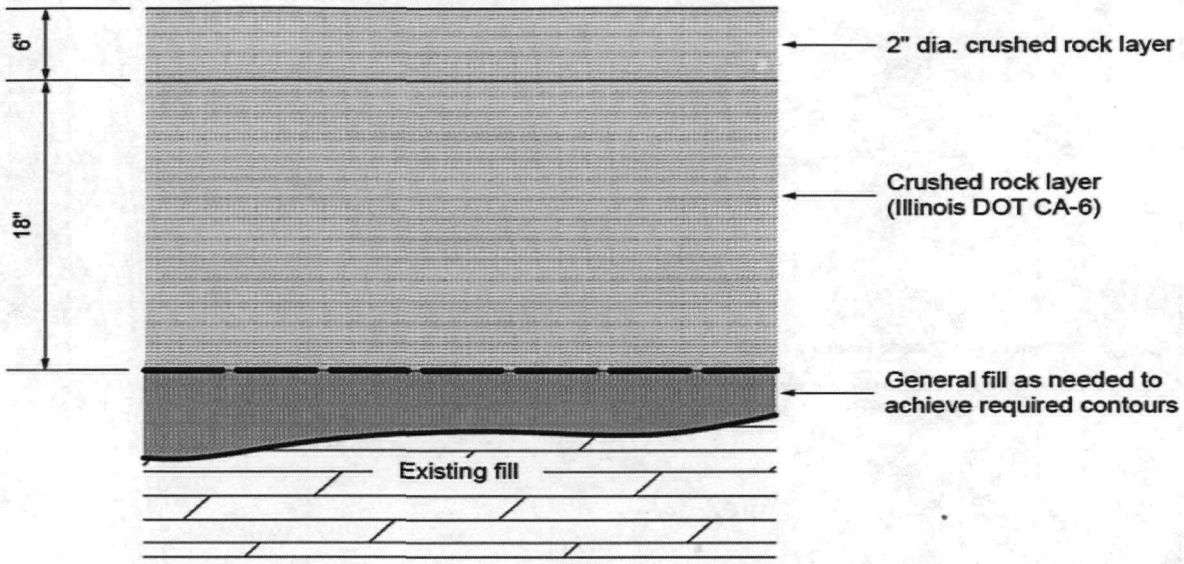
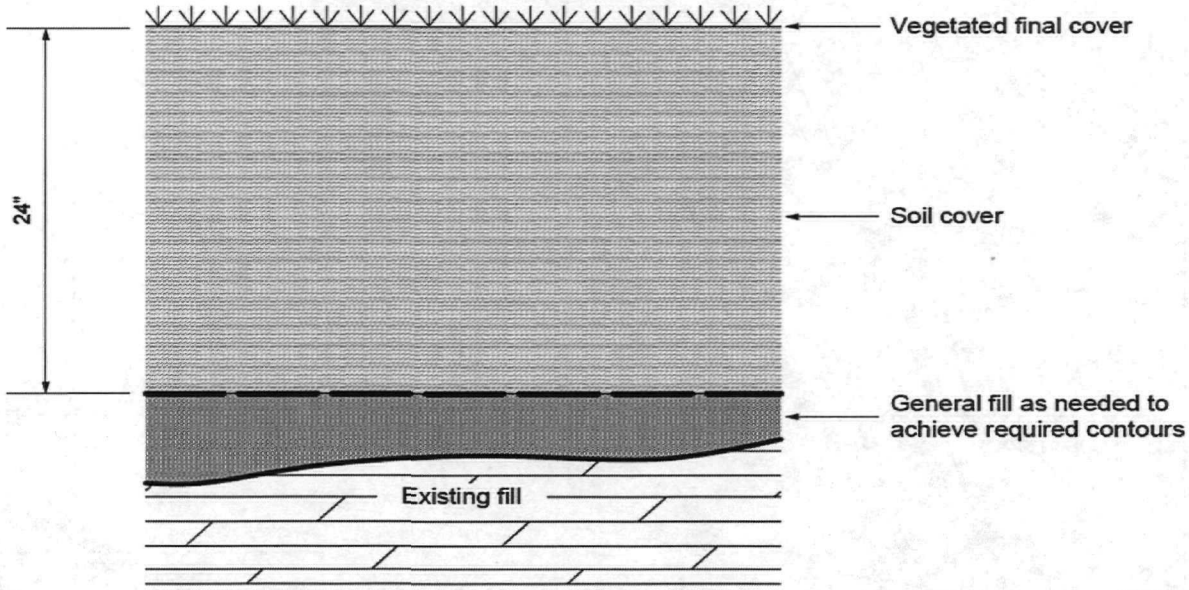


Figure 6: Crushed Rock and Soil Cap Detail



TYPICAL CRUSHED ROCK COVER DETAIL

Not to Scale



TYPICAL SOIL COVER DETAIL

Not to Scale

Table 1 Chart Comparing Cleanup Options with the Nine Superfund Remedy Selection Criteria

● Fully meets criterion ◉ Partially meets criterion ○ Does not meet criterion

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5*
Evaluation Criterion					
1 Overall Protection of Human Health and the Environment	○	○	●	●	●
2 Compliance with ARARs	○	◉	●	●	●
3 Long-term Effectiveness and Permanence	○	◉	●	●	●
4 Reduction of Toxicity, Mobility, or Volume through Treatment	○	○	○	◉	◉
5 Short-term Effectiveness	N/A**	●	●	●	●
6 Implementability	N/A**	●	●	●	●
7 Cost ($ millions)	$0	$3 1	$12 8	$22 5	$14 8
8 State Acceptance	The State supports the preferred alternative (Alternative 5)				
10 Community Acceptance	Will be evaluated after the public comment period				

* EPA's preferred alternative

** N/A not applicable, since no remedy is being implemented in the No-Action Alternative